epiTRENDS

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# A Profile of West Nile Virus: Wider Establishment Likely in Washington in 2003

In late summer 2002, a Western Washington woman developed rash, fever, and a headache after returning home from a visit to Michigan, where she was bitten several times by mosquitoes. An alert dermatologist obtained serum to test for West Nile virus (WNV) antibody. The woman recovered quickly and her illness was confirmed as travel-associated WNV infection.

The 2002 outbreak of WNV infection in the United States, more than 3800 cases, was the largest recorded outbreak of arthropod-borne illness in the Western Hemisphere. WNV, a flavivirus, is closely related to viruses that cause Japanese encephalitis, yellow fever, St. Louis encephalitis (SLE), and dengue. WNV can cause disease in humans, horses, birds, and other vertebrates. In fall 2002, WNV infection was detected in a crow, a raven, and two horses from counties in Eastern and Western Washington. WNV is expected to become more widely established in Washington State during 2003.

## Epidemiology

Prior to 1999, WNV was found only in the Eastern Hemisphere, with distribution in Africa, Asia, the Middle East, and Europe. Human WNV infection in the United States was first reported in New York City in 1999. Between 2000 and 2002, WNV spread throughout the Northeast and mid-Atlantic states, and to the South and the Midwest. As of February 2002, a single human case acquired west of the Rockies has been reported.

During 2002, more than 3800 human cases of WNV were reported from 39 states and the District of Columbia, with the highest concentration of cases in the South and Midwest. Approximately 28% of the reported cases had WNV fever, and 72% had meningitis or encephalitis; 263 people died. Human WNV infection peaked in late August, with onset ranging from May to December.

As of March 1, 2003, WNV activity (infection in birds, mosquitoes, horses, or humans) has been reported in 43 states, including Eastern and Western Washington. To access CDC's latest reported human WNV case count by state, go to the Web site noted in WWW Access Tips on page 4.

Cases of western equine encephalitis (WEE) and SLE virus infection have been identified in Washington in the past. Most cases occurred in the central part of the state, with the last reported case in Chelan County in 1982.

## Transmission

WNV is transmitted primarily by bites of infected mosquitoes. Mosquitoes acquire WNV after feeding on virus-infected birds. The virus is not transmitted between humans by direct contact. However, several new modes of transmission were identified during the 2002 epidemic:

- Several human infections involved recipients of organ transplants and blood transfusions (1,2). The virus was transmitted in organs and units of plasma, red blood cells, and platelets.
- The virus was found in the breast milk of a nursing mother whose infant developed antibodies but did not show clinical illness (3).
- One case of transplacental transmission was documented after maternal infection during the late second trimester. The infant had cerebral abnormalities at birth (4).

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# West Nile Virus *(from page 1)*

- Two laboratory workers acquired WNV infection following percutaneous inoculation (scalpel and needle stick) of infectious materials (5).

### Incubation Period and Clinical Signs

The incubation period is three to 15 days. Knowledge of the spectrum of WNV infection increased substantially during 2002, but the complete range of illness is still unknown. Serologic surveys during epidemics indicate that most WNV infections in humans are asymptomatic. Approximately 20% of infected persons experience a mild, self-limiting febrile illness called West Nile fever, lasting three to six days. Symptoms may include fatigue, anorexia, nausea, vomiting, eye pain, headache, muscle pain, weakness, and rash.

Approximately one of 150 infected persons develops acute meningitis or encephalitis. Associated symptoms may include fever, pronounced weakness, nausea, vomiting, headache, altered mental status, diarrhea, rash, stiff neck, cough, and muscle aches. Long-term or permanent sequelae, including neurologic deficits, are not uncommon among those who have experienced severe WNV infection. The case-fatality rate for encephalitis is 5 to 15%; persons older than 70 years of age have a much higher risk of fatal outcome.

Cases of acute flaccid paralysis (AFP) have been linked to WNV infection. AFP is an asymmetrical poliomyelitis-like syndrome, often without fever or other neurological symptoms (6). Differential diagnosis of AFP includes atypical Guillain-Barré syndrome and stroke. Health care providers are encouraged to consider testing for WNV infection in patients with AFP.

Other syndromes recently associated with WNV infection include movement disorders with static, kinetic tremors severe enough to impede activities, myoclonus of the upper extremities with facial involvement, Parkinsonism (postural instability, bradykinesis), and rhabdomyolysis.

Abnormal laboratory findings among patients in recent outbreaks, including the peripheral white blood cell and cerebral spinal fluid (CSF) profiles, frequently suggested a viral infection. Thirty percent of patients show enhancement on MRI imaging of leptomeninges, periventricular areas, or both. However, no laboratory or radiologic findings are specific for WNV infection.

### Diagnosis

When WNV infection is suspected it is important to rule out other conditions such as toxic encephalopathy, herpes encephalitis, or meningitis due to fungal, parasitic, or bacterial pathogens. Additional differential diagnoses include tick-borne encephalitides, poliomyelitis, rabies, mumps, meningoencephalitis, lymphocytic choriomeningitis virus, aseptic meningitis due to enteroviruses, and postvaccinal or postinfectious encephalitides.

Diagnosis of WNV infection is based on a high index of clinical suspicion and laboratory testing. WNV infection should be strongly considered in adults over 50 years of age who develop unexplained encephalitis or meningitis in the summer or early fall. Suspicion of WNV infection should increase when there is local evidence of human or animal illness. Obtaining information on a patient's occupation, recent history of travel, transfusion, transplantation, and certain immunizations is also important, particularly in nonendemic areas.

### Diagnostic Laboratory Testing

An enzyme-linked immunosorbent assay (ELISA) to detect IgM and IgG antibodies in serum and CSF is available for hospitalized patients through the Washington State Public Health Laboratories (PHL). Testing should be done for any suspected cases with potential exposure to WNV through transfusion, transplant, breast milk, or pregnancy. Serum or CSF should be obtained eight days or

*Continued page 4*

## Progress on the State Smallpox Vaccination Plan

As part of a national emergency preparedness program, the Washington State Department of Health has started Stage 1 of the state's smallpox vaccination plan. In this stage, key public health and health care workers are receiving smallpox vaccine. Included are hospital staff and public health workers participating in smallpox response teams. Military vaccination is occurring separately.

The first smallpox vaccination clinic was held on February 20. A total of eight clinics were completed through March 12 and more than 200 persons have been vaccinated. Five hospitals in Washington State have at least one vaccinated staff member. No serious or life-threatening adverse events have been reported among civilian health care workers vaccinated to date.

# Monthly Surveillance Data by County

## February 2003* – Washington State Department of Health

| County | E. coli O157:H7 | Salmonella | Shigella | Hepatitis A | Hepatitis B | Non-A, Non-B Hepatitis | Meningococcal Disease | Pertussis | Tuberculosis | Chlamydia | Gonorrhea | AIDS | Pesticides† | Lead§# |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Adams | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0/15 |
| Asotin | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 0/0 |
| Benton | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 19 | 1 | 1 | 0 | 0/23 |
| Chelan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 1 | 0 | 1/30 |
| Clallam | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 1 | 0 | 0 | 0/# |
| Clark | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 67 | 7 | 6 | 1 | 0/10 |
| Columbia | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0/0 |
| Cowlitz | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 1/25 |
| Douglas | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0/0 |
| Ferry | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0/0 |
| Franklin | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 0 | 1 | 0 | 0/15 |
| Garfield | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0/0 |
| Grant | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 21 | 1 | 0 | 1 | 0/80 |
| Grays Harbor | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 1 | 0 | 0 | 0/0 |
| Island | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 1 | 0 | 0 | 0/# |
| Jefferson | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0/0 |
| King | 2 | 15 | 10 | 1 | 2 | 1 | 1 | 13 | 14 | 328 | 96 | 19 | 1 | 0/43 |
| Kitsap | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 44 | 1 | 0 | 0 | 0/# |
| Kittitas | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0/0 |
| Klickitat | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 0/0 |
| Lewis | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 1 | 0 | 0 | 0/0 |
| Lincoln | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0/0 |
| Mason | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 1 | 0 | 0 | 0/0 |
| Okanogan | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 26 | 0 | 0 | 0 | 0/18 |
| Pacific | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 1 | 0 | 0 | 0/0 |
| Pend Oreille | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0/0 |
| Pierce | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 7 | 1 | 175 | 44 | 1 | 0 | 0/27 |
| San Juan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0/0 |
| Skagit | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 10 | 1 | 1 | 1 | 0/# |
| Skamania | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0/0 |
| Snohomish | 0 | 10 | 0 | 0 | 2 | 0 | 1 | 3 | 0 | 105 | 19 | 3 | 0 | 0/8 |
| Spokane | 2 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 64 | 11 | 1 | 1 | 0/35 |
| Stevens | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 1 | 0 | 0 | 0/0 |
| Thurston | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 31 | 7 | 0 | 0 | 0/# |
| Wahkiakum | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0/0 |
| Walla Walla | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 11 | 0 | 0 | 0 | 1/30 |
| Whatcom | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 27 | 6 | 1 | 0 | 1/11 |
| Whitman | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 0/# |
| Yakima | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 65 | 7 | 0 | 0 | 2/32 |
| Unknown | | | | | | | | | | | | | | 0/0 |
| Current Month | 5 | 32 | 16 | 3 | 6 | 1 | 4 | 26 | 16 | 1113 | 208 | 35 | 5 | 6/411 |
| February 2002 | 1 | 17 | 5 | 6 | 5 | 2 | 4 | 22 | 12 | 1237 | 269 | 42 | 6 | 9/297 |
| 2003 to date | 8 | 45 | 16 | 5 | 7 | 1 | 6 | 28 | 34 | 2425 | 455 | 83 | 10 | 19/894 |
| 2002 to date | 4 | 22 | 5 | 10 | 5 | 2 | 10 | 25 | 26 | 2374 | 535 | 89 | 11 | 11/569 |

* Data are provisional based on reports received as of February 28, unless otherwise noted.
† Unconfirmed reports of illness associated with pesticide exposure.
§# Number of elevated tests (data include unconfirmed reports) / total tests performed (not number of children tested); number of tests per county indicates county of health care provider, not county of residence for children tested; # means fewer than 5 tests performed, number omitted for confidentiality reasons.

## WWW Access Tips

The CDC's latest reported human WNV case count by state is at http://www.cdc.gov/od/oc/media/wncount.htm/.

### For More Information

For additional clinical information, please refer to: Petersen LR and Marfin AA. West Nile Virus: A primer for the clinician [Review]. *Annals of Internal Medicine* 137:173–9, August 6, 2002.

### *epi*TRENDS online

http://www.doh.wa.gov/Publicat/EpiTrends/03_EpiTrends/2003_trend.htm

## West Nile Virus *(from page 2)*

more after onset of symptoms. Convalescent serum collected two to four weeks after onset may be requested for additional testing. Testing for WNV, available from commercial laboratories, may be appropriate for diagnosis of mild cases of WNV fever. Local health jurisdictions can help clinicians determine whether testing is indicated and can assist with shipping specimens to the PHL. ELISA assays for WNV may cross-react with antibody from yellow fever and Japanese encephalitis vaccination or from infection caused by St. Louis encephalitis (SLE) virus, yellow fever virus, or dengue.

### Treatment

Treatment of WNV is supportive; patients with severe disease may require hospitalization, intravenous fluids, respiratory support, and prevention of secondary infections. Ribavirin and interferon alpha-2b have some activity against WNV in vitro. New York Hospital is conducting a controlled trial of interferon alpha 2b in adult patients with encephalitis and other neurologic syndromes; more information on the trial is available at http://www.nyhq.org/posting/rahal.html/. A vaccine for WNV is not yet available.

### Prevention

Everyone should take precautions to avoid mosquito bites, including use of appropriate mosquito repellents or staying indoors at dusk and dawn, when mosquitoes are most active. This is particularly important for persons at increased risk for adverse outcomes following WNV infection.

### Reporting

The timely identification of persons with acute WNV or other arthropod-borne viral infections is important and will trigger public health responses to reduce the risk of additional human infections. Both suspect and confirmed cases of WNV fever and WNV infection are immediately reportable in Washington. To report a case, contact your local health jurisdiction or call Washington State Department of Health, Communicable Disease Epidemiology at 206-361-2914 or 1-877-539-4344.

### References


1. Update: Investigations of West Nile Virus infections in recipients of organ transplantation and blood transfusion — Michigan, 2002. *MMWR** 51(39):879, October 4, 2002.
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